

**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>A61K 7/025, 7/027, 7/031, 7/032</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 98/42298</b> <b>(43) International Publication Date:</b> 1 October 1998 (01.10.98)
<b>(21) International Application Number:</b> PCT/US98/04704 <b>(22) International Filing Date:</b> 12 March 1998 (12.03.98) <b>(30) Priority Data:</b> 08/824,510 26 March 1997 (26.03.97) US <b>(71) Applicant:</b> AVON PRODUCTS, INC. [US/US]; 1251 Avenue of the Americas, New York, NY 10020-1196 (US). <b>(72) Inventors:</b> CURTIS, Ernest, S.; 423 Leisure Loop, Milford, PA 18337 (US). SHAH, Arvind, N.; 7 Mountainview Avenue, Suffern, NY 10901 (US). PAHLCK, Harold, E.; 36 Leonard Drive, Waldwick, NJ 07463 (US). <b>(74) Agent:</b> RUGGIERO, Charles, N., J.; Ohlandt, Greeley, Ruggiero & Perle, Suite 903, One Landmark Square, Stamford, CT 06901 (US).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> WEAR RESISTANT COSMETICS  <b>(57) Abstract</b>  A wear-resistant cosmetic composition including a styrene-ethylene/propylene mixed block copolymer, preferably from about 0.1 weight percent to about 15 weight percent, in a cosmetically acceptable carrier. The cosmetic composition may also include an alkyl cycloalkylacrylate copolymer, preferably from about 0.1 weight percent to about 15 weight percent.		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakistan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

### WEAR RESISTANT COSMETICS

The present invention relates generally to wear resistant cosmetic compositions. More particularly, this invention relates to a cosmetic composition  
5 containing a styrene-ethylene/propylene mixed block copolymer that demonstrates enhanced wear in combination with a smooth, non-tacky feel.

### BACKGROUND OF THE INVENTION

10 Various organic waxes and film formers are known in the art for their ability to impart uniform films and protective barriers to the skin and lips. Most of these films are slow to dry on application. Because these films remain wet for extended periods  
15 of time, they adhere poorly and tend to transfer off the surface to which they are applied. This results in poor overall cosmetic wear, and requires that the user reapply the cosmetic frequently.

Those film formers that provide somewhat more  
20 rapid drying times have additional limitations. The primary limitation of these film formers is an unpleasant tacky feel on application to the skin, lips or lashes that is disliked by consumers. Also, these products tend to drag against the skin when  
25 applied, and leave the skin feeling dry and sticky.

Accordingly, there is a need for a wear-resistant cosmetic that forms a protective film on the skin that is also quick to dry and easy to apply, but does not have an unpleasant, undesirable tacky  
30 feel on the skin.

### SUMMARY OF THE INVENTION

Against the foregoing background, it is a primary object of the present invention to provide a  
35 cosmetic composition having enhanced wear resistance.

It is another object of the present invention to provide a cosmetic composition that produces a quick drying protective film on the skin.

It is yet another object of the present invention to provide a wear resistant cosmetic composition that is not tacky and neither drags against the skin upon application nor dries the skin.

To the accomplishment of the foregoing objects and advantages, the present invention, in brief summary, comprises a wear-resistant cosmetic composition including a styrene-ethylene/propylene mixed block copolymer, preferably at from about 0.01 weight percent to about 85 weight percent, in a cosmetically acceptable carrier. The cosmetic composition may also include an alkyl cycloalkylacrylate copolymer, preferably at from about 0.01 weight percent to about 85 weight percent.

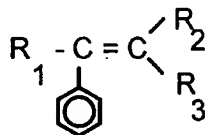
#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides a wear-resistant cosmetic such as, for example, a lipstick, foundation, eye shadow, blush or mascara. It has surprisingly been found that a styrene-ethylene/propylene mixed block copolymer provides superior wear resistance to such cosmetic compositions or formulas, both alone and preferably in combination with an alkyl cycloalkylacrylate copolymer. Moreover, it has surprisingly been found that cosmetic formulas containing the styrene-ethylene/propylene mixed block copolymer are non-tacky and have a pleasant feel when applied to the skin. These compositions are easy to apply, have improved skin and lip adherence (transfer resistance), and provide enhanced wear and longevity.

Most preferably, the wear-resistant cosmetic composition according to the present invention includes a styrene-ethylene/propylene mixed block copolymer in a cosmetically acceptable carrier. This  
 5 cosmetic composition may also include an alkyl cycloalkylacrylate copolymer as a primary ingredient or in combination with the mixed-block copolymer.

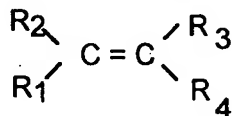
The preferred styrene-ethylene/propylene mixed block copolymer of the present invention is a block  
 10 copolymer made up of styrene, ethylene and propylene type monomers having the following general structure:

Styrene

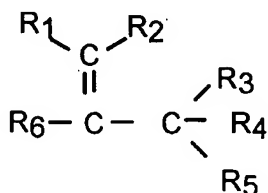


15

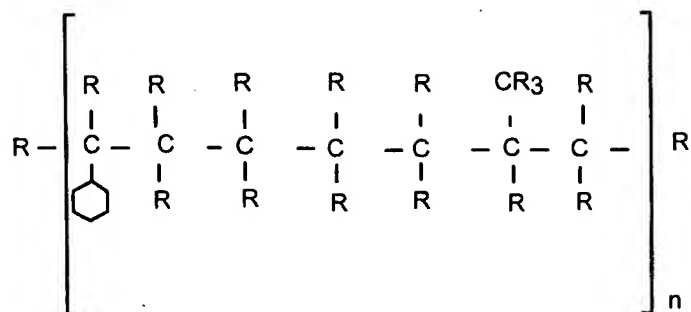
Ethylene



Propylene



20 where  $R_1$  to  $R_6$  are independently hydrophobic alkyl chains. One possible structure of the copolymer, with the repeating monomer subset shown in brackets, is:



wherein  $n \geq 1$  and the R groups may be the same or  
 5 different, and are independently hydrophobic alkyl  
 chains.

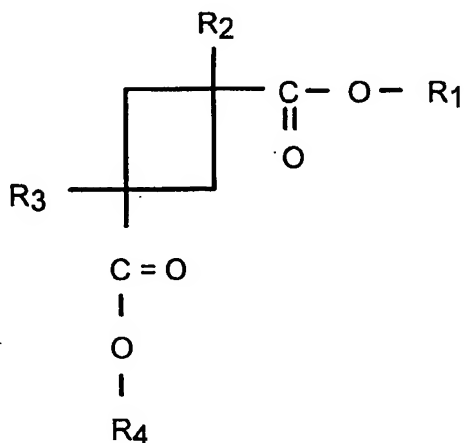
The most preferred styrene-ethylene/propylene  
 mixed block copolymer for use in the present  
 10 invention is available from Brooks Industries as Gel  
 Base (Code 05895). Gel Base (Code 05895) is a  
 styrene-ethylene/propylene mixed block copolymer in  
 combination with isododecane, that is provided as a  
 cloudy white gel. The specific structure of the Gel  
 15 Base (Code 05895) styrene-ethylene/propylene mixed  
 block copolymer is proprietary to Brooks Industries.

This mixed block copolymer is not water soluble,  
 but is soluble in certain oils and hydrocarbon  
 solvents such as isoparaffin and isododecane. This  
 20 allows the mixed block copolymer to be delivered in a  
 volatile solvent base to the skin. Once delivered,  
 the volatile solvent evaporates, at least partially,  
 leaving the water insoluble mixed block copolymer  
 film on the skin. This film resists transfer and  
 25 wear. The mixed block copolymer is most preferably  
 used in combination with a silicone-containing base  
 (containing, for example, dimethicone/cyclomethicone)  
 or an organic volatile in an aqueous base, for  
 superior feel and wear.

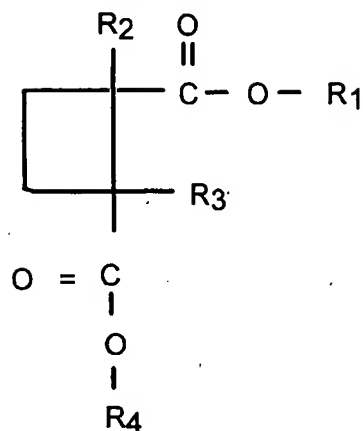
In a preferred embodiment, the styrene-ethylene/propylene mixed block copolymer is from about 0.01 percent by weight to about 85 percent by weight (weight percent) of the total weight of the composition. In the most preferred embodiment, the  
 5 styrene-ethylene/propylene mixed block copolymer is from about 0.1 to about 15 percent by weight of the composition. It should be understood that one or more styrene-ethylene/propylene mixed block  
 10 copolymers may be used in the present compositions.

When the composition includes the alkyl-cycloalkylacrylate copolymer, the preferred alkyl-cycloalkylacrylate copolymer is a copolymer or copolymers having the following formulas and the  
 15 isomers thereof:

Structure A



Structure B



where R<sub>1</sub> to R<sub>4</sub> are independently hydrophobic alkyl chains. The alkyl cycloalkylacrylate copolymers are soluble in hydrocarbons, such as isododecane, but not in water, thus enhancing the film-forming effect of the copolymer in a volatile solvent base.

When included, the alkyl cycloalkylacrylate copolymer or copolymers can be from about 0.01 percent by weight to about 85 percent by weight. Preferably, this copolymer is about 0.1 percent by weight to about 15 percent by weight of the composition.

The composition may also include other ingredients, such as a volatile solvent, wax, powder, non-volatile oil, and emulsifier.

The volatile solvent of the present invention acts as a carrier for the other components of the cosmetic, rapidly and evenly dispersing them on the skin, and then evaporating. The preferred volatile solvent includes C<sub>6</sub> to C<sub>20</sub> hydrocarbon fractions, more preferably an isoparaffin and most preferably the specific C<sub>12</sub> fraction isododecane. Alternatively, cyclomethicone, up to a preferred limit of about 30 weight percent, is also favored.



The volatile solvent may be present in an amount from about 0.01 percent by weight to about 85 percent by weight. However, in certain compositions, less volatile solvent than the maximum 85 percent by weight is desired. For example, a foundation preferably contains no more than about 50 percent by weight of volatile solvent. One or more volatile solvents may be present in the above total amount.

The preferred wax or waxes can be of vegetable, synthetic or hydrocarbon origin. The wax preferably should have a melting point in the range between about 35°C to 120°C. The wax is present in an amount from about 0.01 percent by weight to about 50 percent by weight of the composition. A greater amount of wax is preferred in an anhydrous blush or lipstick than in a mascara. Therefore, the amount of wax in an anhydrous blush or lipstick is preferably about 0.01 percent by weight to about 50 percent by weight, whereas in a mascara, the amount of wax is preferably about 0.01 to about 25 percent by weight of the composition.

The dry powder, as discussed above, gives color and sheen to the cosmetics of the present composition. The preferred dry powder includes an organic or an inorganic powder or a combination thereof. The dry powder preferably is a certified organic lake, a stain or an inorganic pigment having a particle size between about 0.02 and about 85 microns in diameter. The dry powder or powders component is preferably present in an amount from about 0.1 percent by weight to about 65 percent by weight of the composition, with the higher figure most suitable for such products as lipsticks or foundations. A blush or mascara preferably contains no more than about 20 to 25 weight percent of powder.

It is also preferred, depending on the final product being formulated, to include a nonvolatile oil, emulsifier, water or a combination thereof to the finished cosmetic composition. The copolymers of  
5 the present invention are suitable for use in both water-based and anhydrous systems.

A preferred cosmetic composition according to the present invention comprises from about 0.01 weight percent to about 85 weight percent of a block  
10 copolymer of styrene, ethylene and propylene type monomers. In a more preferred embodiment, the composition also includes from about 0.01 weight percent to about 85 weight percent of alkyl cycloalkylacrylate copolymer. Another preferred  
15 cosmetic composition according to the present invention comprises:

- 1) from about 0.01 weight percent to about 85 weight percent of a block copolymer of styrene, ethylene and propylene type monomers;
- 20 2) from about 0.01 weight percent to about 85 weight percent of alkyl cycloalkylacrylate copolymer;
- 3) from about 0.01 weight percent to about 85 weight percent volatile solvent;
- 4) from about 0.01 weight percent to about 50  
25 weight percent wax;
- 5) from about 0.1 weight percent to about 65 weight percent dry powder; and
- 6) from about 0.01 weight percent to about 80 weight percent non-volatile oil, emulsifier and/or  
30 water.

As discussed above, one or more of each ingredient may be used, but with the total amount of that ingredient set forth above.

Within the preferred ranges set forth above, the  
35 following Examples 1 through 3 set forth preferred

subset compositions for foundations, blushes or lipsticks, and mascaras, respectively.

Example 1

5

FOUNDATION

		<u>Wt. %</u>	
		<u>From about</u>	<u>To about</u>
	Styrene-ethylene/propylene mixed block copolymer	0.01	15
10	Alkyl cyclomethacrylate copolymer	0.01	15
	Volatile Solvent	0.01	50
	Wax	0.01	30
	Powder	0.1	65
15	Nonvolatile oil, emulsifier and water	0.01	55

Example 2

20

ANHYDROUS BLUSH/LIPSTICK

		<u>Wt. %</u>	
		<u>From about</u>	<u>To about</u>
	Styrene-ethylene/propylene mixed block copolymer	0.01	10
25	Alkyl cyclomethacrylate copolymer	0.01	20
	Volatile Solvent	0.01	60
	Wax	0.01	50
	Powder	0.1	25
30	Nonvolatile oil and emulsifier	0.01	55

Example 3

MASCARA

35

		<u>Wt. %</u>	
		<u>From about</u>	<u>To about</u>
	Styrene-ethylene/propylene mixed block copolymer	0.01	30
	Alkyl cyclomethacrylate copolymer	0.01	50
40	Volatile Solvent	0.01	70
	Wax	0.01	25

Powder	0.1	20
Nonvolatile oil, emulsifier and water	0.01	50

- 5        The following are illustrative preferred  
embodiments.

Example 4 - Pigmented Foundation

10	Isododecane	25.00
	Silica-fumed	0.50
	Isooctahexacontane	1.00
	Bentone gel	3.00
	Isododecane/mixed block	
15	copolymer	6.00
	Cycloalkylmethacrylate	
	copolymer/isododecane	2.00
	Laurylmethicone copolyol	2.00
	Polyglycerol diisostearate	0.75
20	Glyceryl tribehenate	0.75
	Glyceryl rosinate	4.00
	Cosmetic powder	8.75
	Cosmetic pigment	12.695
	Demineralized water	27.785
25	Disodium EDTA	0.20
	Sodium hexametaphosphate	0.15
	Sodium chloride	0.50
	Butylene glycol	4.00
	Methylparaben	0.40
30	Xanthan gum	0.01
	Imidazolidinyl urea	0.50

Example 5 - Waterproof Mascara

	Odorless Mineral Spirits	32.35
35	Isododecane/Mixed Block	
	Copolymer	15.00
	Cycloalkylmethacrylate	
	copolymer/isododecane	4.00
	Pentaerythritol rosinate	2.50
40	Iron oxide	5.00
	Cosmetic wax	9.30
	Cosmetic powder	13.00
	Hydroxylated lanolin	1.30
	Glyceryl Pyroglutamate	
45	Monooleate	0.50
	Polybutene	0.10
	Butylated hydroxytoluene	0.02
	Propylparaben	0.25
	Demineralized water	14.88

	Polyvinylpyrrolidone	0.10
	Tetrasodium EDTA	0.20
	Acetylated POE lanolin	
	alcohol	0.20
5	Propylene glycol	1.00
	Methylparaben	0.30
	2-phenoxyethanol	0.50

10                                    Example 6 - Blush

	Tridecyl trimellitate	14.68
	Isododecane/mixed block	
	copolymer	4.95
15	Isododecane	7.35
	Cyclomethicone	4.50
	Cycloalkylmethacrylate	
	copolymer/isododecane	20.00
	Pentaerythritol rosinate	1.20
20	Isopropyl lanolate	5.00
	Cosmetic wax	22.00
	BHT	0.02
	Ethylhexyl palmitate	5.00
	Jojoba oil	0.50
25	Ethylhexyl methoxycinnamate	1.00
	Tocopherol acetate	0.05
	Organic pigment lake	0.55
	Iron oxide	1.35
	Titanium dioxide	3.85
30	Mica	8.00

Example 7 -- Lip Color

35	Cosmetic wax	14.60
	Diisostearyl fumarate	9.80
	Stearyl dimethicone	3.90
	Ethylhexyl methoxycinnamate	3.20
	Benzophenone 3	1.50
40	Iron oxide pigment	9.60
	Cosmetic powder	2.84
	Cyclomethicone	45.05
	Isododecane	6.00
	Isododecane/mixed block	
45	copolymer	2.00
	Squalane	1.50
	Cycloalkylmethacrylate	
	copolymer/isododecane	0.01

50

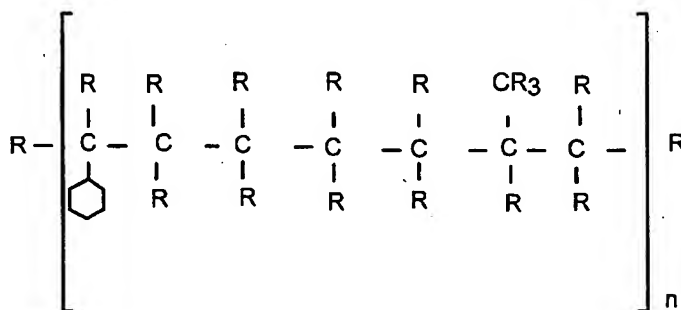
The invention having been thus described with particular reference to the preferred forms thereof,

it will be obvious that various changes and modifications may be made therein without departing from the spirit and scope of the invention as defined in the appended claims.

What we claim is:

1. A wear-resistant cosmetic composition comprising a styrene-ethylene/propylene mixed block copolymer in a cosmetically acceptable carrier.

2. The cosmetic composition of claim 1, wherein said styrene-ethylene/propylene mixed block copolymer is of a structure as follows:



wherein  $n \geq 1$  and R represents independently hydrophobic alkyl groups of identical or different types.

15

3. The cosmetic composition of claim 1, wherein said styrene-ethylene/propylene mixed block copolymer is present from about 0.01 percent by weight to about 85 percent by weight of a total composition weight.

20

4. The cosmetic composition of claim 1, wherein said styrene-ethylene/propylene mixed block copolymer is present from about 0.1 weight percent to about 15 percent by weight of a total composition weight.

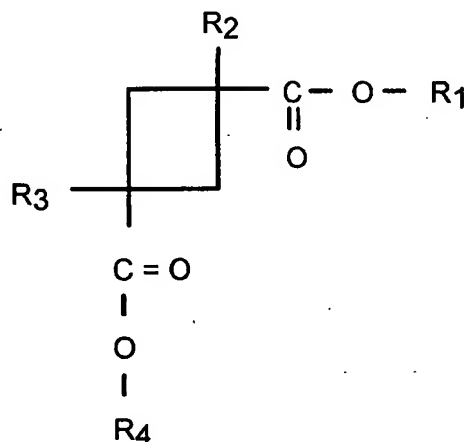
25

5. The cosmetic composition of claim 1, further comprising an alkyl cycloalkylacrylate copolymer.

5 6. The cosmetic composition of claim 5, wherein said alkyl cycloalkylacrylate copolymer is of a structure selected from the group consisting of Structure A, Structure B, an isomer of Structure A, an isomer of Structure B, and a combination thereof:

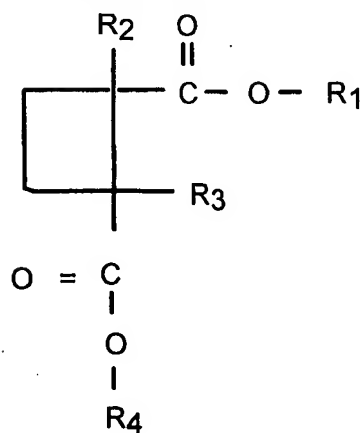
10

Structure A



15

Structure B





where R1 to R4 are independently hydrophobic alkyl chains.

7. The cosmetic composition of claim 5,  
5 wherein said alkyl cycloalkylacrylate copolymer is present at from about 0.01 weight percent to about 85 weight percent.

8. The cosmetic composition of claim 5,  
10 wherein said alkyl cycloalkylacrylate copolymer is present at from about 0.1 weight percent to about 15 weight percent.

9. The cosmetic composition of claim 1,  
15 wherein said carrier comprises a volatile solvent.

10. The cosmetic composition of claim 9,  
wherein said volatile solvent is present at from about 0.01 weight percent to about 85 weight percent.  
20

11. The cosmetic composition of claim 10,  
wherein said volatile solvent includes a volatile hydrocarbon.

12. The cosmetic composition of claim 10,  
25 wherein said volatile solvent is silicon-based.

13. The cosmetic composition of claim 1,  
wherein said carrier includes a volatile hydrocarbon.  
30

14. The cosmetic composition of claim 1,  
wherein said carrier includes silicone.

15. The cosmetic composition of claim 1,  
further comprising from about 0.01 weight percent to  
about 50 weight percent wax.

5        16. The cosmetic composition of claim 1,  
further comprising from about 0.1 weight percent to  
about 65 weight percent dry powder.

17. The cosmetic composition of claim 1,  
10 wherein said carrier comprises water.

18. The cosmetic composition of claim 1,  
further comprising a non-volatile oil.

15        19. The cosmetic composition of claim 1,  
further comprising an emulsifier.

20. A wear-resistant cosmetic composition  
comprising an alkyl cycloalkylacrylate copolymer.  
20

21. A wear-resistant cosmetic composition  
comprising:

from about 0.01 to about 30 percent by weight  
styrene-ethylene/propylene mixed block copolymer;

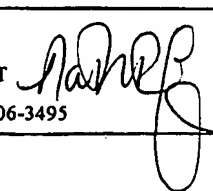
25        from about 0.01 to about 50 percent by weight  
alkyl cyclomethacrylate copolymer;

from about 0.01 to about 70 percent by weight  
volatile solvent;

30        from about 0.01 to 50 percent by weight wax; and  
from about 0.1 to 65 percent powders.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US98/04704

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(6) : A61K 7/025, 7/027, 7/031, 7/032 US CL : 424/64, 70.7, 401 According to International Patent Classification (IPC) or to both national classification and IPC																										
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 424/64, 70.7, 401 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched NONE Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) NONE																										
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>																										
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																								
X	US 5,558,872 A (JONES et al.) 24 September 1996, column 2, line 26 and claim 1.	1-4																								
---		---																								
Y		9-19																								
Y	US 5,219,560 A (SUZUKI et al.) 15 June 1993, abstract, columns 11-14, and examples.	9-19																								
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.																										
<table border="0"> <tr> <td>* Special categories of cited documents:</td> <td>*T</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>*A</td> <td>document defining the general state of the art which is not considered to be of particular relevance</td> <td></td> </tr> <tr> <td>*E</td> <td>earlier document published on or after the international filing date</td> <td>*X</td> </tr> <tr> <td>*L</td> <td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>*O</td> <td>document referring to an oral disclosure, use, exhibition or other means</td> <td>*Y</td> </tr> <tr> <td>*P</td> <td>document published prior to the international filing date but later than the priority date claimed</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td></td> <td></td> <td>*g</td> </tr> <tr> <td></td> <td></td> <td>document member of the same patent family</td> </tr> </table>			* Special categories of cited documents:	*T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	*A	document defining the general state of the art which is not considered to be of particular relevance		*E	earlier document published on or after the international filing date	*X	*L	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	*O	document referring to an oral disclosure, use, exhibition or other means	*Y	*P	document published prior to the international filing date but later than the priority date claimed	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art			*g			document member of the same patent family
* Special categories of cited documents:	*T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention																								
*A	document defining the general state of the art which is not considered to be of particular relevance																									
*E	earlier document published on or after the international filing date	*X																								
*L	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone																								
*O	document referring to an oral disclosure, use, exhibition or other means	*Y																								
*P	document published prior to the international filing date but later than the priority date claimed	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art																								
		*g																								
		document member of the same patent family																								
Date of the actual completion of the international search 29 MAY 1998		Date of mailing of the international search report 22 JUN 1998																								
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 308-4363		Authorized officer JYOTHSNA VENKAT  Telephone No. (703) 306-3495																								